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Propagation-based Differential Phase Contrast X-ray Imaging of Soft Tissue

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The high transverse coherence of the X-rays produced form laser-driven X-ray sources has been used for in-line holographic hard X-ray imaging of murine livers as well as clathrate hydrate slurries. The employed phase-sensitive X-ray imaging method is fundamentally different from conventional X-ray shadowgraphy because the mechanism of image formation does not rely on differential absorption by matter. Instead, X-ray beams undergo differential phase shifts and subsequently interfere constructively or destructively at the X-ray detector. Hence, material densities are distinguished by the differences between the real parts of their refractive indices rather than their absorptive properties. Recent progress in the area of phase-sensitive X-ray imaging of bio-medical tissues as well as density waves in materials is discussed. Example images of cancer bearing livers are presented.